WO94/21080

Device for displaying characters in a video system

The present invention relates to a device for displaying characters in a video system, wherein the said characters can be displayed transparently on a background consisting of the normal television image. The use of the invention is particularly advantageous when the analog video signal corresponding to the background image is encoded according to a standard which requires the chrominance data to be frequency modulated.

The invention relates to the field of television and its peripheral applications.

More and more video appliances (video recorders, laser video disc readers, decoders) make use of the display of text on the screen in order to facilitate the exchange information with the user. Such texts may include programming menus, status reports, teletext, to quote just a few examples. For this purpose the said appliances include a character generator, the role of which is to insert data corresponding to the text to be displayed into the video signal.

The whole text generation device then supplies either a RGB signal or a signal encoded according to a particular standard (for example PAL, NTSC, SECAM). The insertion of text for example in a composite video base band signal (referred to hereafter as a CVBS signal) is done by multiplexing in a manner known to the person skilled in the art, the CVBS with the luminance plateaux corresponding to the characters to be displayed. Therefore at predetermined moments the video data of the CVBS signal (luminance and chrominance) is replaced by difference luminance data.

The introduction of the plateaux overwrites the colour data (chrominance) initially present. According to the PAL and NTSC standards the chrominance is amplitude modulated. During luminance plateaux due to the text the amplitude of the chrominance signal is zero; the text on the screen is simply more or less dark grey. In SECAM the chrominance is frequency modulated. The luminance plateaux are generally raised and introduce frequency variations into the CVBS signal. As a consequence the appearance of numerous chrominance errors on

the screen is observed, errors which result in considerable inconvenience in reading of the text and/or in visual comfort.

A known solutions used in order to reduce the chrominance errors consists of, before the insertion of text, sampling the chrominance data in the CVBS input signal by means of a bandpass filter targeted on the central frequency of the chrominance. This data is then reinserted into the video signal containing the inserted text. This procedure is used in the so-called "MIXED MODE" operational mode, with one part of the screen including the text and the other part including the picture. The text then takes the colour of the picture. The level of luminance of the text is chosen to be high in order to provide good visibility. This solution has drawbacks. The amplitude of the chrominance data in fact varies both when text is present and when a part of the original CVBS signal is present, which can cause a breakdown of the signal. Moreover, it is preferable in multi-standard systems to implement the bandpass filter only for a standard of the SECAM type for which the chrominance is frequency modulated. For this reason an interrupter is provided at the shunt of the bandpass filter in order to deactivate this at the required moment. It is also necessary to provide a control logic for this interrupter which must also open when it is desired to display a text in the absence of any CVBS signal or when the video signal is prepared solely by the text generator, in order to prevent the CVBS signal from disturbing the text. This latter mode is known as "FULL PAGE MODE". Moreover, the bandpass filter has a capacitance and an inductance, elements which are difficult to integrate.

Therefore the cost of this solution is not negligible.

In the devices which utilise the usual text generators, the inserted text totally masks the corresponding parts of the picture. This may be annoying particularly in the case where a menu for adjusting the picture by remote control masks a large part of this picture, or when it is desired to keep a text displayed while wishing to follow the normal program.

The object of the invention is to alleviate these drawbacks.

The invention relates to a device for displaying characters in a video system, characterised in that the said device effects the insertion of text in the video signal and that it then forms a weighted average of the signal comprising the text and of the original video signal.

In this way in the resulting signal the chrominance data is not overwritten but simply attenuated. A bandpass filter is no longer necessary.

The luminance of the original picture is also taken into account. It is also superimposed in attenuated fashion on the luminance data corresponding to the text. The result on the screen is an effect of transparency of the text; the viewer has the impression of seeing the original picture through a milky or dark filter according to the luminance of the text. Therefore it is possible to follow a television program whilst still having access to the displayed text.

Another advantage is that outside the text zones the signal is identical to the original signal.

Moreover, the device according to the invention is also used with standards which do not employ frequency modulation for encoding the chrominance. Thus it is also possible to take advantage of the effect of transparency in this case.

According to a particular embodiment the user has the choice between displaying the said resulting weighted video signal or the video signal into which the text has been inserted. When the choice falls on this latter signal the resulting picture has a habitual opaque text.

According to a particular embodiment the weighted signal is used at least when the original video signal is a base band video signal in which the chrominance is frequency modulated.

According to a particular embodiment the weighting is effected by two resistors in series subjected to the difference in voltage between the video signal with text and the original video signal, the signal present at the mid point between the two resistors being the desired weighted signal. The use of resistors enables easier integration of the device.

Other advantages and characteristics of the invention will become apparent from the description of a particular embodiment illustrated in a non-limiting manner by the appended drawings, in which:

- Figure 1 shows a functional diagram of a device for displaying characters according to the invention;

- Figure 2 shows a variant of the device of Figure 1 comprising a synchronisation reinsertion device.

In the drawings the same parts bear the same references.

According to the illustrated embodiment the input signal of the device is a composite video base band signal (so-called CVBS signal).

According to another embodiment the input signal of the device is a luminance signal also comprising a synchronisation (so-called Y signal). A black and white television signal or a luminance signal to the SVHS standard are examples of this.

As illustrated in Figure 1, the display device according to the invention includes a clamping circuit 2 which clamps the input signal (CVBS 0) at a reference voltage. The clamping circuit 2 co-operates with a clamping capacitor 1. The clamped signal is supplied in parallel to two output amplifiers (3 and 4) which serve as impedance adapters. The first circuit branch thus formed also includes at the output of the amplifier 4 a "tri-state" control 5 controlled by a circuit (not shown) of which the operation will be described below. When it is desired to obtain a "transparent" text the control 5 conducts normally and behaves as a closed interrupter.

The second circuit branch includes after the amplifier 3 an interrupter 6 controlled by the character generator 7. The interrupter connects the input of a matching amplifier 9 either to the output of the amplifier 3 or to a line 8 of which the voltage is controlled by the character generator 7. The output of the amplifier 9 is connected to a terminal of a resistor 10, the

output of the control 5 is connected to a terminal of a resistor 11. The two other terminals of the resistors 10 and 11 are connected and form the output terminal 13 of the circuit.

The character generator 7 is synchronised with the line, field and pixel frequencies prepared in a known manner by a synchronisation extractor and a phase-locked loop from the signal CVBS 0. The character generator 7 includes *inter alia* a RAM containing the text to be displayed, a ROM containing the character matrices, as well as a horizontal and vertical time base circuit. The said time base makes it possible to generate the necessary addresses for reading the RAM containing the text to be displayed (for example in the form of ASCII code). The character generator 7 also includes a luminance circuit which produces a luminance signal based on the character matrices supplied by the said ROM. This signal varies in time and includes luminance plateaux according to the type of insertion to be effected (character background or character shape for example). The luminance signal is present on the line 8. When an insertion is to take place the generator 7 actuates the interrupter 6 by way of an insertion signal (so-called "fast blanking signal") in such a way as to connect the line B to the input of the amplifier 9. Thus at the required moment a part of the video signal is replaced by the luminance signal of the character generator 7.

The character generator described above is given merely by way of example. It is quite obvious that generators of a different design can be used. The problem of the insertion *per se* of a text into a video signal is known moreover and for this reason the operation of the character generator *per se* will not described excessively. On the other hand it should be noted that the character generator 7 described above supplies only a luminance insertion signal. A character generator having the capacity to generate colour text can certainly be envisaged.

If the signal present on the terminal of the resistor 10 connected to the amplifier 9 is designated CVBS 1 and the signal present on the terminal of the resistor 11 connected to the control 5 is designated CVBS 2, the signal CVBS 3 recovered at the terminal 13 is given by the relation:

$$CVBS\ 3 = \frac{R11 \times CVBS\ 1 + R10 \times CVBS\ 2}{R11 + R10}$$

where R10 and R11 represent respectively the values of the resistors 10 and 11.

Therefore CVBS 3 is a weighted average of the signals CVBS 1 and CVBS 2. When no text is inserted into CVBS 1 there will be an equality between the signals CVBS 1 and CVBS 2, and the output signal CVBS 3 will be equal to the clamped input signal CVBS; no modification takes place.

In the presence of text a weighted average is formed between on the one hand the luminance corresponding to the text and on the other hand the luminance and chrominance of the original signal CVBS. On the screen this results on the one hand in an effect of transparency of the text and on the other hand in an attenuation of the chrominance errors engendered by the insertion, whereby the chrominance data is not eliminated but simply attenuated.

When the control 5 is put into the high impedance state only the signal CVBS 1 reaches the point 13. Everything happens as if the resistor 11 were infinite. Consequently there will be equality between CVBS 3 and CVBS 1. An inserted text will appear opaque on the screen, the picture underneath having been suppressed.

According to a preferred embodiment the control 5 is conductive when the input signal CVBS 0 is a composite video signal of which the chrominance data is frequency modulated. This is the case with a SECAM signal. For other types of signals, such as OAL and NTSC signals, it can be left to the user to make the choice, by way of the remote control of the appliance comprising the device according to the invention, between a text in opaque mode or in transparent mode.

According to a particular embodiment the resistors 10 and 11 are such that:

$$\frac{R\ 11}{R\ 10} = 3$$

These values correspond respectively to 3/4 and 1/4 weighting coefficients for the signal with opaque text and the original signal. This constitutes a good compromise between legibility of the text and transparency, when the luminance level of the characters is chosen close to white and the luminance level of the background of the characters is chosen close to black.

According to a particular embodiment the ratio of the value of the resistors can be modified, particularly as a function of the standard of the encoded video signal. This modification can be effected for example by deriving the signal CVBS 1 towards a resistance other than the resistance 10 but also connected to the point 13.

According to a particular embodiment the 3/4 and 1/4 weighting coefficients respectively for the signal with opaque text and the original signal are used in connection with the PAL and NTSC standards.

According to a particular embodiment, 2/3 and 1/3 weighting coefficients respectively are used for the signal with opaque txt and the original signal in connection with the SECAM standard.

In the choice of resistors the luminance plateaux chosen for the text will be taken into account.

According to a particular embodiment the device according to the invention includes a synchronisation reinsertion. This embodiment is illustrated in Figure 2. A synchronisation reinsertion circuit 12 is positioned between the clamp 2 and the amplifiers 3 and 4. This circuit 12 receives from a divider 15 a signal emitted by the phase-locked loop 14 corresponding to the frequency of the line synchronisation signals. The loop 14 receives the synchronisation signal extracted from the input signal by an extractor 16.

The role of the synchronisation reinsertion 12 is to reinsert, from the clock coming from the phase-locked loop 14, a synchronisation pulse into the clamped video signal. This may be useful when the input signal exhibits synchronisation pulses of which the phase varies ("jitter"). If a reinsertion had not been carried out, the "jitter" would appear between the synchronisation signals controlling the character generator 7 and the synchronisation signals of the clamped video signal, resulting in a poor vertical alignment of the lines of text.

What is important is that the branching point leading to the amplifiers 3 and 4 is placed after the reinsertion so that at the input of the resistors 10 and 11 the corresponding signals are well in phase.

Ultimately it is understood that the invention is not limited to the examples of signals given.

Claims

1. Device for displaying characters in a video system, characterised in that the said device effects the insertion of text in the original video signal and that it then forms a weighted average of the signal comprising the text and of the said original video signal.

2. Device as claimed in Claim 1, characterised in that the said device comprises means (5) for choosing between the weighted video signal and the video signal in which the text has been inserted.

3. Device as claimed in any one of the preceding claims, characterised in that the said weighted average is formed when the input signal of the device is a composite video base band signal or a luminance signal comprising a synchronisation.

4. Device as claimed in any one of the preceding claims, characterised in that the said weighted average is formed at least when the video input signal of the device (CVBS 0) is a composite video base band signal in which the chrominance is frequency modulated.

5. Device as claimed in Claim 4, characterised in that the said video signal is a signal to the SECAM standard.

6. Device as claimed in any one of the preceding claims, characterised in that the weighted average is formed by recovering the weighted signal at the mid point (13) of two resistors (10, 11) in series, the free end of the resistors (10, 11) receiving respectively the original video signal and the video signal in which the text to be displayed has been inserted.

7. Device as claimed in any one of the preceding claims, characterised in that it comprises a clamping circuit (2) connected to a clamping capacitor (1), the clamped signal supplying two circuit branches in parallel, one o these branches including a character generator (7) which inserts the text to be displayed in the video signal of this first branch, the other branch including a "tri-state" control (5).

8. Device as claimed in any one of the preceding claims, characterised in that the insertion of text in the video signal is effected by a text generator which inserts luminance plateaux corresponding to the text to be displayed.

9. Device as claimed in any one of the preceding claims, characterised in that it comprises a synchronisation reinsertion circuit of known type.

10. Device as claimed in any one of the preceding claims, characterised in that the weighting coefficients are 3/4 for the video signal in which the text has been inserted and 1/4 for the original video signal.

11. Device as claimed in Claim 9, characterised in that the coefficients 3/4 and 1/4 are used for signals to the PAL or NTSC standards.

12. Device as claimed in any one of Claims 1 to 8, characterised in that the weighting coefficients are 2/3 for the video signal in which the text has been inserted and 1/3 for the original video signal.

13. Device as claimed in Claim 12, characterised in that the coefficients 2/3 and 1/3 are used for signals to the SECAM standard.

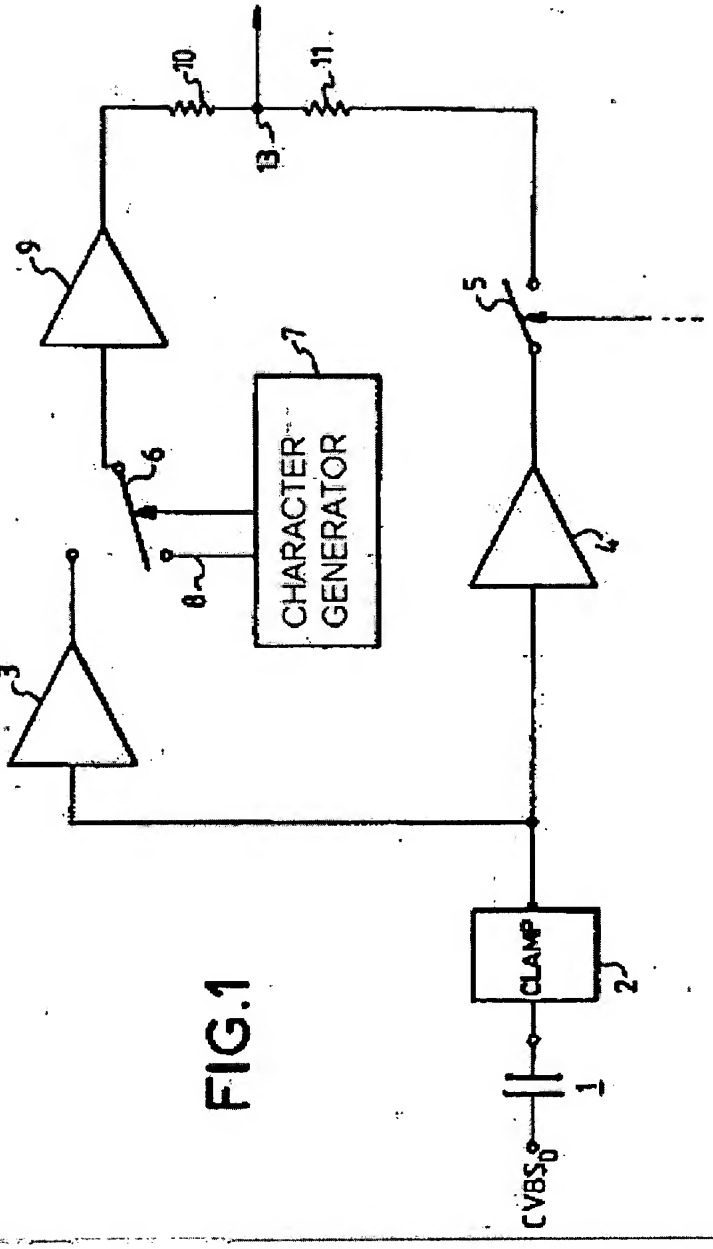

FIG.1

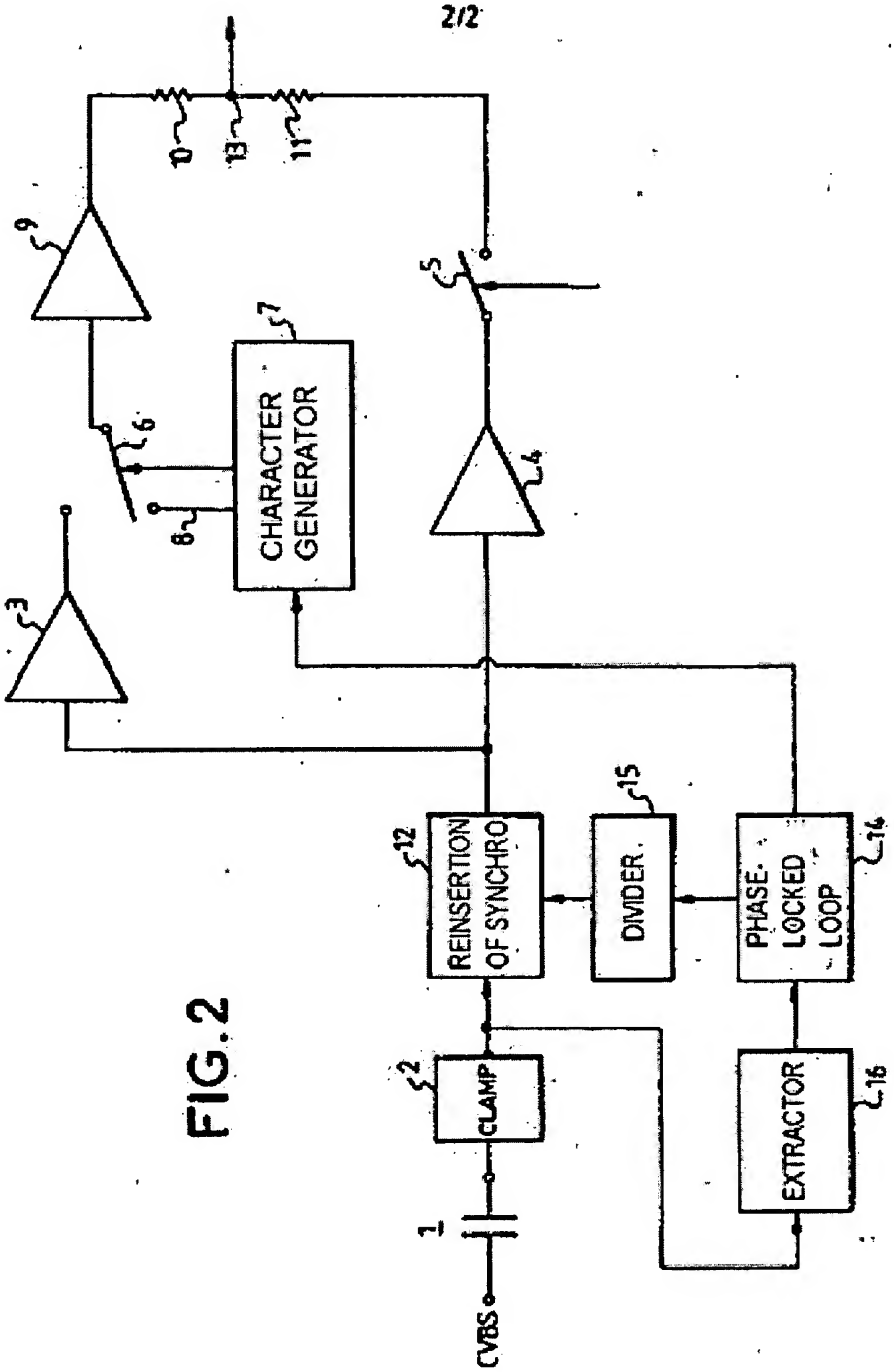
10
13
11
9
5
7
CHARACTER GENERATOR
6
8
4
3
12
REINSERTION OF SYNCHRO
15
DIVIDER
PHASE-LOCKED LOOP
14
2
CLAMP
16
EXTRACTOR
1
CVBS

FIG. 2